secondly, with respect to the laws which govern the exchange of products in the market ; thirdly, with respect to the forces which distribute the product of industry, in larger or smaller shares, among the several classes of persons who take part in production ; fourthly, with respect to the influences which the different modes of consumption exert upon the disposition and the ability to take part in the future production of wealth.

And if wealth admits of being considered in these several aspects, it seems to me clear that such a classification will conduce both to completeness of view and to accuracy of judgment. We shall have occasion to note (Pars. 247-249), a very striking instance of the mischief that has arisen from the neglect of this classification by recent writers in economics.

PART II.—PRODUCTION.

CHAPTER I.

LAND AND NATURAL AGENTS.

45. What is the Production of Wealth?—By this term we signify all those acts and courses through which it comes about that an article confers upon its possessor the power, irrespective of legal authority or personal sentiments, to command, in exchange for itself, the labor, or the products of the labor, of others. Briefly and somewhat elliptically, we may say, the production of wealth means the creation of values.

This, of course, does not imply the creation of matter; it does not, of necessity, imply even a change of form in the thing which before had not value but now becomes possessed of it.

46. Modes of Production.—A distinguished German professor has classified values, in respect of their origin, as time-value, place-value, and form-value. Thus, a cake of ice which has no value in the winter may acquire value through being kept over into the following summer. The preservation of the ice, whatever of effort and care and expenditure that may involve, is the production of wealth to that extent. The value thus created would be, in the phrase of Prof. Knies, time-value.

Again, a cake of ice which has in summer a certain value in the region where it was first formed, say, Maine, would have a much higher value in a semi-tropical region, where water is seldom frozen at any season of the year, say, Louisiana. The transportation of the ice, and its protection from the melting heat of the climate, would be a further production of

wealth. The value thus created would be, in the phrase of the writer already quoted, place-value.

In neither this nor the former case has human effort effected the formation of the ice, which work was the gratuitous operation of nature. The vast bodies of values created by commerce are mainly what would be termed place-values, the value created in giving form to the articles concerned being but small in comparison.

In the creation of form-value, there is the widest possible range of operations, mechanical or chemical, from that of the agriculturist, by whose intervention the black earth of the prairie is transmuted into golden grains, to that of the lace-maker, whose whole industry is to arrange his gossamer into fantastic shapes. However little the material may be wrought, and by whatever agencies that little may be effected, we say that wealth is produced whenever value is added or acquired through any act or any process.

47. The Agents of Production.—The three primary agents in the production of wealth are Land, Labor and Capital.*

48. Land.—The school of economists in France, prior to the revolution, who were known as the Physiocrats, insisted upon regarding land as the sole source of wealth. According to this school, of which the physician Quesnay was the founder, labor is incapable of creating value except as employed upon the soil. Agriculture is, therefore, the sole means of increasing the wealth of a nation. All applications of labor or capital in manufacture, in transportation, or in trade, must be barren, since there is no net produce remaining, as in agriculture,† after the expenses of cultivation have been met.

There was this much of truth in the physiocratic theory,

* Labor will form the subject of Chapter II of the present book; Capital, the subject of Chapter III. We shall necessarily speak of labor and of capital before reaching those topics, in their due order, but what we shall thus say will be confined within limits which will allow no misunderstanding on the part of the reader.

† That there is a surplus in agriculture, over the cost of production, is sufficiently proved by the payment of rent to the owner of land. (See Chapter on Rent.)

that the raw material of all manufactures, the subject matter of all trade and transportation, comes originally from the soil; and its value can not escape the influence of the great, comprehensive principle to which we give the name, "the law of diminishing returns in agriculture," the principle, namely, that after a certain stage of cultivation has been reached, the soil fails to yield a proportionally increased return to new applications of labor and capital. Since, then, this law is so far-reaching and all-embracing that even the operations of trade and manufacture do not escape its influence, it requires to be stated here with great precision and fullness of illustration. There is no use in the reader going on if he does not master this principle in all its bearings. He might just as well stop short here, for, as Prof. Cairnes has said, if this principle did not exist, "the science of political economy would be as completely revolutionized as if human nature itself were altered."

49. The Great Law of Agricultural Production.—In any given condition of the art of agriculture, there is a limit to the amount of labor and of capital which can advantageously be employed or expended upon a given area of land. If, after this limit has been reached, more laborers are employed, each will have to be content with a smaller quantity of produce at harvest. And, in the same way, if more capital be expended upon the land, each dollar of capital—whether in the form of hoes or carts or oxen, will make a smaller addition to the crop of the year than a dollar expended before the point of diminishing returns was reached. We shall sufficiently illustrate the principle if we confine our view to applications of labor, assuming the amounts of capital to increase correspondingly with the number of laborers.

50. Increasing Returns.—Let us suppose that ten laborers, with a certain outfit of tools and implements, are engaged in cultivating, in common, a tract of land of a hundred acres, producing 2,000 bushels of wheat a year, being twenty bushels per acre, and two hundred bushels per capita. Now, let it be supposed that two new laborers appear and join themselves to this company. What will be the crop of that year for the

united twelve, assuming agricultural conditions constant? Will it be 2,400 bushels, or more, or less? The answer to this question will depend upon whether the point of diminishing returns has been reached with the original ten laborers, or not. If not, the crop of the new year may be not merely 2,400 bushels, but even more, say, 2,500 bushels, since, the limit of the chemical capabilities of the soil not being reached, the mechanical advantages which result from the division of labor, to be explained under a subsequent title, will enable the twelve laborers to raise more, per man, than the ten could do.

51. Diminishing Returns.—But if the limit indicated in paragraph 49 had been reached when the ten were laboring together upon the land, the new crop will fall short, much or little, of 2,400 bushels; and consequently, each of the twelve laborers will have to be content with less than 200 bushels. Let us suppose the crop to amount to 2,280 bushels, each acre producing 22.8 bushels. Each man will, then, receive 190 bushels as his share.

Now, let it be supposed that three additional laborers are received into the company. Will the crop now be 3,000 bushels, or 200 bushels per man of the fifteen? Clearly not. Will it prove to be 2,850 bushels, 28.5 bushels per acre, giving each man 190 bushels as his share, as before? Not if the industrial character of the laborers and the knowledge of the art of agriculture undergo no change. If twelve laborers make the land yield but 22.8 bushels per acre, the fifteen can not make the same amount of land yield 28.5 bushels per acre. The crop will be something less than that: say, 27 bushels per acre, which would give each man 180 bushels.

If, again, we suppose five additional laborers to join the company, the crop will not be 40 bushels per, acre; as would be necessary in order to give each man 200 bushels, which the original ten received; or 38 bushels per acre, as would be necessary in order to give each man 190 bushels which the first twelve received; or even 36 bushels per acre, as would be necessary in order to give each man 180 bushels, which the first fifteen received; but the crop could not be forced by the

labor of twenty laborers above, say, 32 bushels per acre, which would give each of the laborers 160 bushels.

No. of laborers.	No. of bushels per acre.	Total No. bushels on the whole tract.	Each laborer's share.
10	20	2000	200
12	22.8	2280	190
15	27	2700	180
20	32	3200	160

In like manner, it would be found that, however far the accession of new laborers were carried, each new arrival would result in reducing the quantity of grain which each laborer of the entire body could obtain by a year's work. This reduction of the *per capita* produce would go forward, at first slowly and afterwards rapidly, until the result would be reached, that, whereas the original company lived comfortably, or even luxuriously, the forty or fifty who had come to work on the same area would be found living wretchedly, perhaps reduced to the verge of starvation.

52. This Condition is Universal.—About the universal application of this condition there can be no intelligent question. There is not an acre of land on the face of the earth on which 60 and afterward 120 bushels of wheat can be raised by the application, first of twice, and afterward of four times, the amount of labor needed to produce 30 bushels. At some time in the progressive cultivation of every field, sooner or later, according to the state of agriculture, a stage will be reached after which every successive increment of the product will be obtained only through a more than proportional expenditure of labor. This condition applies, not only to the cultivated field, but to grazing lands, to the mine, the forest and the sea. It governs the cost of producing fish and whale oil; fuel and timber for manufactures; coal, iron and copper, for the furnace and the forge; wool for clothing, and the carcasses of cattle and sheep for food. The operation of the principle is in some of these cases obscured by the accident of great discoveries of natural stores and resources, or important inventions

in the chemical or mechanical arts involved in the extraction of these articles for the use of man.*

53. The Law of Diminishing Returns in Application to Manufactures.—Such is the law of diminishing returns in agriculture. As has been stated, no part of the field of production but is overshadowed by this great dominating condition of human life and labor. Not only is the whole body of agricultural produce subject to its influence, but the raw material of all manufactures, and the subject matter of all trade and transportation, coming originally from the soil, are affected in value by the increasing difficulty which attends each successive increment of product.

But while no part of the field of production lies beyond the shade of this primary condition, various classes of products are affected by it in very different degrees, according as they stand nearer to, or further from, agriculture or the purely "extractive" industries. Thus, every product of iron, is in some measure, subject to the influence of this condition. If a greater and still greater quantity of iron ore is to be derived from a given number of known mines, this involves mining at a lower and still lower depth, which, in turn, involves a greater expenditure of labor in hoisting, ventilating, pumping, etc.

But it is only the iron, as ore, or as an ore product, which is subject to this condition. If a hundred weight of ore be rendered into pig iron, the cost of the latter will be very much increased by the necessity of mining at an increasing depth. If the pig iron be taken to the forge or foundry, and there rendered into plate iron or stove castings, the cost of the latter will be enhanced but little if any more, since the production of wealth, (*i. e.*, the creation of values) by mechanical processes, is not subject to the law of diminishing returns. Ten men in mechanical pursuits can produce ten times as much as one. If, again, the iron be rendered by successive processes into fine screws, knife-blades or watch springs, the first cost of the material becomes small, in comparison with the cost of the labor expended in working and perfecting it.

* It has been shown that this principle of increasing difficulty, or of diminishing returns, applies even to the harvesting of crops. Roscher quotes from Von Thünen a table showing the experience of agricultural laborers in attempting to glean all the potatoes of a field. Supposing 100 scheffels to represent the quantity grown on a given area, a single laborer could gather 30 in a day, while the average of the first four laborers would be 20. But the fifth man would only gather 6.6; the sixth man only 4.4; the seventh man only 3, and so on.

Mr. Babbage, in 1832, estimated that bar iron of the value of $1 became worth when manufactured into—

Slit iron for rails	$ 1.10
Horseshoes	2.55
Wood saws	14.28
Scissors, best	446.94
Penknife blades	657.14

It is evident that the only part of the cost of the $657 worth of knife blades, here, which is affected by the condition of diminishing returns, is the original dollar's worth of bar iron, and the cost of the bushel or two of coal necessary to produce the mechanical power and the melting and tempering heat for the successive processes of manufacture. An increase of the difficulty of mining which should double the price of bar iron might affect the price of scissors very slightly.

54. So far, then, as human wants can be met through the elaboration of the raw materials taken from the soil, there is a constant tendency to a greater and still greater satisfaction of those wants, through the perfection of mechanical and chemical processes. But, after all, the chief concern of the masses of the people is with the cost of the raw materials of food, clothing and shelter. The bulk of their consumption is of coarse forms of agricultural produce, simply prepared. It is of no advantage to the laborer that at a small additional expense he can have his cotton wrought into forms which a century ago would have excited the admiration of a court, if all the cotton he can procure is not enough to keep him warm.

55. The Soil, a Fund for the Endowment of the Human Race.—Subject always to the condition which has been described in the foregoing paragraphs, the soil, consisting of

rock pulverized at one period or another of the world's existence, constitutes the sole original endowment of the human race. The different varieties of soil possess the capability of rewarding human labor in very different degrees; but every kind of decomposed rock will, if treated with due quantities of water, yield vegetables, grains or fruits for man's food, fibers for his clothing, timber to construct his house, fuel to warm it. Even the undecomposed rock which forms the crust of the earth, constitutes a store from which human wants may be supplied, though in smaller degree and with greater pains. Metals and minerals, of an almost infinite number of uses, mechanical, chemical, physiological, are extracted by the aggressive enterprise of man from the very rock which has withstood unbroken all the effects of fire and frost, earthquake and torrent. It is wholly upon this natural endowment that the race have lived in the past; and it is the extent of this endowment which is to determine the maximum number the race can reach, aud the longest period of time through which the race can survive. Now, of this fund with which mankind are endowed, we note, in addition to the limited capability of production within a given season, upon a given area, already dwelt upon, that the fund, in the present state of the art of agriculture, is subject to waste and possible ultimate exhaustion.

56. Exhaustion of the Soil.—Those writers who advocate what is known as the policy of Protection, have made great use of the fact that the soil is subject to exhaustion; that its productive capabilities are, in the strict sense of the word, a fund, from which so much and no more can be taken. Besides the outright destruction of fertility due to wanton abuse of nature, the ordinary prudent use of the soil steadily diminishes the fund of productive essences from which future generations must draw their supplies of food, clothing and shelter. "For every fourteen tons of fodder carried off from the soil," says Prof. Johnston, "there are carried away two casks of potash, one of soda, a carboy of vitriol, a large demijohn of phosphoric acid and other essential ingredients."

But what becomes of the materials thus taken away?

Surely, if the doctrines of modern physical science are true, no force can be lost out of nature; consumption must be followed by production in other forms; or, rather, consumption is nothing but the production of new forms.

It is true that no force can be lost out of nature; yet force may be transmuted from forms in which it ministers to human wants into forms in which it serves no purpose useful to man, as, for example, when your house burns down and goes off into the air, in sudden heat and with a great smoke; or a certain amount of force may be so dissipated that men can no longer employ it for their advantage. The productive essences taken from the soil, in the form of food for man and beast, may, without being diminished in actual amount, be so scattered as to be unavailable for the nourishment of vegetable life in the future.

"Whenever," says Prof. R. E. Thompson, "the products of the soil are consumed in the vicinity of the farm, the farmer will have at hand the means of making such a return to the soil as will keep up and even increase its fertility. But whenever they are transported to a considerable distance for consumption, the power to make an adequate return to the soil is seriously diminished, if not absolutely destroyed. The richest soil can not long sustain such a process of exhaustion, if its proprietors are engaged in sending its natural wealth over land and sea to a distant market".

57. Free Trade and Exhaustion of the Soil.—It is upon this the protectionist bases his chief argument. He claims that local markets should be everywhere created to prevent what he calls "earth-butchery." The tendency to make new countries the magazines from which older countries draw their supplies of raw materials should be crossed and checked by legal impositions, not so much upon the exportation of the raw materials from the former, as on the importation of finished products from the latter. Every considerable community should be driven, against the impulses of immediate interest, to fashion for its own consumption the materials produced from its own soil.

Now, the most obvious and natural answer to this is, that

men are the best judges of their own interests, and that producers and consumers should be left to make their bargains unhindered. But it will appear, in the further progress of our inquiry, that the interests of individuals do not always consist with the interests of the community. This is clearly seen, in the case of the felling of the forests, where immense injury may be done to the soil, an injury perhaps that is practically irreparable, through the selfish action of a few persons seeking their own immediate advantage.

If the same is not true in an equal degree of the abuse of the soil through an excessive drain upon its productive essences, due to the passion for sudden gain inducing the cultivators to take much from the ground and put back little, this is due to two facts. First. The arable land of a country is generally owned by a larger number of persons than the wood land, so that more of those who would suffer by the effects of an abuse of nature are in a position to prevent abuse. Secondly. The consequences of "earth-butchery" in the destruction of forests are more instant and less remediable than in the waste of the soil in cultivation.

58. Some Waste Unavoidable.—The liability to exhaustion of the soil, through exportation of its produce, is a fact properly to be taken into account. The importance which should be attributed to the fact is a matter of question. I believe the protectionist writers generally give it more weight than it deserves, chiefly through omitting two considerations.

First. Even the building up of manufacturing and commercial towns would not prevent a large part of the waste.

In nearly all such towns, when of considerable size, the excreta of men and even of animals, and, also, to a great extent, the refuse of kitchens and of manufactures, are thrown into the streams and carried out to sea. The utilization of sewage, on any large scale, has never yet been made profitable. It has been done as a matter of experiment, as a matter of sentiment, or to prevent the defilement of rivers; but almost invariably it costs, in the present state of the arts, more than a hundred cents on the dollar's worth of soil-dressing

obtained. Some waste of this kind seems inseparable from the human occupation of the earth.

59. Natural Renewal of the Soil.—Secondly. The protectionist's argument overlooks the consideration that, in addition to the progress of invention, postponing, though it may not avert, exhaustion, a continuous addition is being made to the soil available for the raising of food, through the decomposition of rocks and the formation of rockdust (weathering). The mountain loses of its substance by the force of frosts and floods, and the valleys are enriched with the material thus worn away. Even the stones that lie in the earth, a mere encumbrance to cultivation, yield to the unceasing action of the elements that surround them and give up to the soil the same properties to which its pristine fertility was due. Moreover, the conversion of the nitrogen of the atmosphere into nitrates (nitrification), is continually going on. "In rare cases," writes one of the most eminent of agricultural chemists, "these agencies alone maintain a high state of fertility, as where red-rock easily disintegrates and is exceptionally rich in plant food, or where plains are fertilized by the matter brought from mountains and deposited by streams. More commonly, these natural causes maintain a moderate productiveness only, and require tillage, irrigation and manuring to raise the production to a high pitch: tillage, irrigation and manuring all operating to accelerate and intensify rock-disintegration and nitrification; irrigation and manuring acting also by replacing removed matters.

"Any region that has once been fertile for a period of fifty years, under a given system of management, may remain fertile under that system forever, unless the soil is removed or buried by flood, or unless the climate becomes unpropitious."*

*Prof. S. W. Johnson, of Yale College, Director of the Connecticut Agricultural Experiment Station.

Prof. Johnson further remarks: "The crops that astonish us by their heavy acreage-yield are not the crops that feed the nations. The wheat fields and corn fields of 'the West' yield but 15 bushels of wheat and but 40 to 50 bushels of corn. The hay, the pasturage, which make up the grand total of our forage, are obtained at an average rate of one ton,